4-15-8

RESTRICTED

CAMT 4-15-8

DGOS TECHNICAL LIBRAR
DEPT. OF NATIONAL DEFENCE
COPY No. ....
ACC No. ....
DEC 8 1969
FROM 200 ELGIN ST.
OTTAWA, ONT.

CANADIAN ARMY

MANUAL OF TRAINING

ARTILLERY TRAINING

COAST ARTILLERY TRAINING
FIRE CONTROL AND DRILL

CONTROL ROOM DRILL USING THE MK 3B FIRE DIRECTION TABLE WITH THE BALLISTIC CALCULATOR

1953

REPRINTED BY DIRECTION
OF
THE CHIEF OF THE GENERAL STAFF

ARMY HEADQUARTERS

OTTAWA

REF TECH
UF
455
C2
A78
1953

DRILL IN THE CONTROL ROOM USING THE MARK 3B FIRE DIRECTION TABLE WITH THE BALLISTIC CORRECTION CALCULATOR.

1953

This pamphlet supersedes Coast Artillery Drills, Part I —
Pamphlet No. 18, 1944 (Code No. 7424)
and is a reprint of CAMT 4-219

ABBREVIATIONS

2. The following abbreviations are used in this pamphlet:—

BC	Battery commander
BCC	Ballistic correction calculator
CR	Control room
crh	Calibre radius head
DPF	Depression position finder
FC	Fire control
FDT	Fire direction table
MCFIA	Magslip cable failure indicating apparatus
OP	Observation post
OPA	Observation post officer's assistant
OPO	Observation post officer
PO	Plotting officer
POA	Plotting officer's assistant
RF	Range finder
T/F	Time of flight
VSG	Variable speed gear

CONTENTS

SECTION PAGE

CHAPTER 1—GENERAL

1. The detachment........ 9
2. Position in action........ 9

CHAPTER 2—PREPARATION FOR ACTION (GENERAL)

3. The manning parade........ 10
4. Preparation of stores (general duties)........ 10
5. Preparation for action (general)........ 11

CHAPTER 3—PRAPARATION FOR ACTION (THE TABLE)

6. General........ 14
7. To start up the auxiliary generator (onan)........ 15
8. To prepare the Mk 4 T/F indicator for action........ 15
9. To prepare the BCC for action........ 16
10. To renew paper on the plots........ 16
11. To position the pens on the plots........ 17
12. To alter the charge pack........ 17
13. To test the FDT hand drive........ 18
14. To test and adjust the main speed drive........ 18
15. To prepare the MCFIA for action........ 19
16. To line up the FDT........ 20
17. To set the BCC........ 24

CHAPTER 4—TESTING COMMUNICATIONS AND MAGSLIP TRANSMISSION

18. General........ 24
19. To test telephones........ 25
20. To test loudspeakers........ 26
21. To test signal indicators........ 26
22. To test shot, T/F and look-in indicators........ 27
23. To test dials with magslip transmission........ 30
24. To close down the auxiliary generator (onan)........ 36
25. Reports on completion of preparation for action........ 36
26. To stand easy........ 37

CHAPTER 5—DRILL IN ACTION

27. General duties.. 38
28. Initial orders.. 41
29. To start the FDT.. 43
30. To operate the FDT drives.. 43
31. To operate the Mk. 4 T/F indicator.. 44
32. To Grid up.. 45
33. To correct the FDT rates.. 46
34. To mark the plots.. 47
35. To apply corrections.. 47
36. Orders during the engagement of a ship target.. 48
37. Engagement of a turning target.. 50
38. To change the system of range-finding.. 51
39. To change to a fresh target.. 52
40. Interruption of fire.. 52
41. To Rest.. 53
42. Termination of a shoot.. 53
43. Scales zero.. 53
44. To check dials.. 54
45. To stand easy.. 55
46. To cease firing.. 55
47. Duties of the CR duty man.. 55

CHAPTER 1

GENERAL

SECTION 1—The Detachment

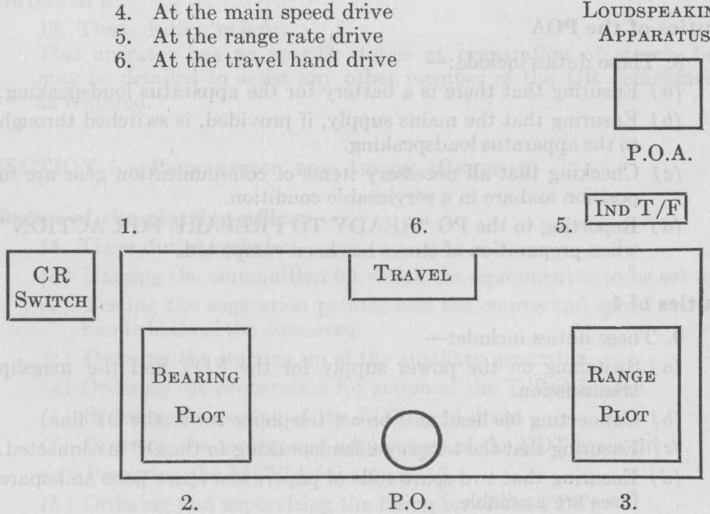
3. The control room detachment consists of the plotting officer, the plotting officer's assistant and six table operators, ie:—

1. Telephonist to OP
2. Bearing plot operator
3. Range plot operator
4. Main speed drive operator
5. "Turns" operator
6. Travel hand drive operator

SECTION 2.—Positions in Action

4. The positions in action are as follows:—

PO At the dumaresq
POA At the apparatus loudspeaking (to the guns)
1. At the control room switch
2. At the bearing plot
3. At the range plot
4. At the main speed drive
5. At the range rate drive
6. At the travel hand drive



CHAPTER 2

PREPARATION FOR ACTION (GENERAL)

SECTION 3.—The Manning Parade

5. The control room detachment falls in in two ranks; the POA and odd numbers in the front rank, and the even numbers in the rear rank. The POA stands to the right of the front rank and is not covered off ie,

5 3 1 POA
6 4 2

6. The POA will check that the detachment is correct and will report "Control room detachment—CORRECT" or otherwise.

7. On the order "PREPARE STORES" the POA marches the detachment to the control room. If the stores are required to be drawn elsewhere, the POA will draw them before proceeding to the CR.

SECTION 4.—Preparation of Stores (General Duties)

Duties of the POA

8. These duties include:—

(a) Ensuring that there is a battery for the apparatus loudspeaking.

(b) Ensuring that the mains supply, if provided, is switched through to the apparatus loudspeaking.

(c) Checking that all necessary items of communication gear are in position and are in a serviceable condition.

(d) Reporting to the PO "READY TO PREPARE FOR ACTION" when preparation of stores has been completed.

Duties of 1

9. These duties include:—

(a) Switching on the power supply for the FDT and the magslip transmission.

(b) Connecting his head and breast telephone set to the OP line.

(c) Ensuring that the telephone loudspeaking to the OP is connected.

(d) Ensuring that two spare rolls of paper, two spare pens and spare fuses are available.

Duties of 2 and 3

10. These duties include:—

(a) Providing themselves with pencils.

(b) Ensuring that the pens are filled with ink, and that they are in position.

(c) Checking that there is sufficient unused paper on the rollers.

Duties of 4

11. These duties include:—

(a) Fixing the stop-watch in its position on the FDT.

(b) Ensuring that the necessary range arms are available for the BCC.

(c) Fixing the BCC to the CR wall, if necessary.

Duties of 5

12. These duties include:—

(a) He will ensure that the stop-watch, *table of set ahead angles* and *rate of turn table* are available for use during turns procedure.

Duties of 6

13. These duties include:—

This operator has no specific duties at preparation of stores, but may be detailed to assist any other member of the CR detachment as required.

SECTION 5.—PREPARATION FOR ACTION (GENERAL)

Duties of the plotting officer

14. These duties include:—

(a) Naming the ammunition for which the equipment is to be set up.

(b) Testing the suggestion pointer and the course and speed setting handwheels of the dumaresq.

(c) Ordering the starting up of the auxiliary generator.

(d) Ordering the preparation for action of the T/F indicator.

(e) Ordering the testing of the FDT hand drive.

(f) Ordering the testing and adjustment of the FDT main drive.

(g) Preparing the MCFIA for action.

(h) Ordering and supervising the lining up of the FDT.

(*j*) Ordering and supervising the testing of dials throughout the battery.

(*k*) Ordering the closing down of the auxiliary generator.

(*l*) Reporting the battery ready for action.

(*m*) Ordering the application of stand-by bearing and range, and of ballistic corrections.

(*n*) Detailing the duties required to be carried out on the order "STAND EASY".

Duties of the plotting officer's assistant

15. These duties include:—

(*a*) Passing reports and orders between the plotting officer and the guns.

(*b*) Setting the communications gang switch as required.

(*c*) Testing telephone to the guns.

(*d*) Testing loudspeakers to the guns.

(*e*) Ordering the testing of signal indicators.

(*f*) Assisting in testing shot indicators.

(*g*) Assisting in testing dials.

Duties of 1

16. These duties include:—

(*a*) Supervising generally the work of the remainder of the FDT detachment.

(*b*) Passing orders and reports between the PO and the OP.

(*c*) Ensuring that the fuses in the fuse box are correct.

(*d*) Ensuring that two spare rolls of paper, two spare pens, and fuses are available.

(*e*) Testing the CR switch handwheels.

(*f*) Testing the bearing hand drive.

(*g*) Assisting in testing the telephone and loudspeaker communications with the OP.

(*h*) Connecting up, or switching on, the power supply for the FDT and magslip transmission.

(*j*) Assisting in lining up the FDT.

(k) Ensuring that the oil tank below the table is filled to the correct level. (A gauge is fitted to the side of the tank for this purpose). Should the oil level be incorrect the armament artificer (instrument) must be informed; but if time will not permit this, the No. 1 will fill the tank to the level marked on the gauge, using OIL HYDRAULIC OM 35.

(l) Checking the pressure at the oil pump while the FDT is running. Pressure should be 65—70 lb. per square inch.

(m) Inspecting the unions and couplings for oil leaks.

(n) Assisting in testing dials.

(o) Collecting reports, and reporting the FDT ready for action.

Duties of 2 and 3

17. These duties include:—

(a) Ensuring that he has at least two pencils sharpened and ready for use.

(b) Testing the suggestion mechanism.

(c) Where necessary, filling up the RF pen with red ink and the gun pen with blue ink.

(d) Ensuring that both pens are correctly adjusted to mark the paper.

(e) Ensuring there is sufficient unused paper on the roller, and renewing it if necessary.

(f) Testing the bearing spotting box, and setting the pointer to zero at the completion of the test.

(g) Tuning the plots to the various test points and reporting the readings on the receiver follow up dials when ordered to do so by the PO during the testing of dials.

(h) Assisting in testing the FDT main drive.

(j) Assisting in lining up the FDT.

(k) Reporting on the equipment for which they are responsible.

Duties of 4

18. These duties include:—

(a) Winding the stop-watch, ensuring that it is in working order, and placing in its position.

(b) Setting the clutch to motor drive.

(c) Preparing the BCC for action.

(d) Setting the BCC and reporting ballistic corrections.

(e) Operating the governor shorting switch and the governor regulator during the testing of the main speed drive.

(f) Testing the main speed hand drive.

Duties of 5

19. These duties include:—

(a) Testing the range hand drive.

(b) Ensuring that the table of 'set ahead angles' is fitted with the correct range strip for the equipment, charge and crh in use.

Duties of 6

20. These duties include:—

(a) Testing the travel correction hand drive.

(b) Assisting the PO in lining up the FDT.

(c) Starting up and closing down the auxiliary generator.

CHAPTER 3

PREPARATION FOR ACTION (THE TABLE)

SECTION 6.—GENERAL

21. The PO is in charge of preparation for action. He is responsible that the correct procedure is followed.

22. The POA will assist the PO by ensuring that the correct reports are given by the guns, as will the FDT 1 by a general supervision of the actions of the remainder of the FDT detachment.

23. All verbal orders, such as those given by the PO to members of the FDT detachment, will be acknowledged by the word "THROUGH". All telephone messages will be acknowledged in the normal way.

24. The procedures detailed in sections 7-11 inclusive will be carried out simultaneously. As soon as the personnel concerned have completed these procedures and have given the appropriate reports, the PO will proceed with the succeeding tests in sequence (except that he must carry out the testing of the MCFIA (sec. 15) while the main power is switched on, as during the testing of the main drive (sec. 14)).

SECTION 7.—To Start the Auxiliary Generator (ONAN)

25. *(a)* The PO orders "START UP AUXILIARY GENERATOR".

(b) 6 acknowledges, and proceeds to the engine room to check that:—

- (i) The fuel tank is full.
- (ii) The lubricating oil level is correct.
- (iii) The radiator is full of the appropriate coolant.
- (iv) All terminal connections are tight.
- (v) The general circuit breaker is switched off.

(c) He starts up the generator as follows:—

- (i) Ensure that the fuel line cut-off is fully open.
- (ii) Pull the choke fully out.
- (iii) Press the start button (or, for manual starting, turn the crank).
- (iv) When the engine starts push in the choke.
- (v) Check that the engine ammeter indicates 'charge'.
- (vi) When the engine is running smoothly, switch on the circuit and check that the voltmeter reads approximately 120 volts.
- (vii) Switch on the engine room switch if provided.

(d) He then returns to the CR and reports "AUXILIARY GENERATOR CORRECT" (or otherwise).

SECTION 8.—To Prepare the MK 4 T/F Indicator for Action

26. *(a)* The PO orders "PREPARE T/F INDICATOR FOR ACTION".

(b) 5 acknowledges, and proceeds as follows:—

- (i) Check the 24-V. D-C connections for the shot indicators and the 12 V. D-C connections for the T/F indicator.
- (ii) Check that the range dials issued with the T/F indicator are available, and fit the one for ammunition named.
- (iii) Ensure that the range dial turns freely from 4½ to 96½ seconds T/F.
- (iv) Ensure that the motor is fully wound.
- (v) Start the motor and, with stop-watch in hand, observe the pin-wheel through the inspection window.

- (vi) When the index line on the pin-wheel comes into coincidence with the index line on the inspection window, start the stop-watch.
- (vii) When the index lines again coincide, stop the stop-watch.
- (viii) If the stop-watch reading exceeds 96 seconds by more than $\frac{3}{4}$ second, turn the speed regulator slightly counterclockwise: If it falls short by more than $\frac{3}{4}$ second, turn slightly clockwise.
- (ix) If an adjustment is made, re-check the speed, re-adjust and recheck as necessary.
- (x) When the speed is correct, stop the motor, and stop and rewind the stop-watch and return it to its holder on the FDT.

(c) 6 reports "T/F/ INDICATOR READY FOR ACTION".

SECTION 9—To Prepare the BCC for Action

27. Tables are hung on the wall of the CR near the BCC showing:—
- *(a)* Times of flight for every 1,000 yards up to the maximum range of the guns, for each projectile and charge with which the battery is equipped.
- *(b)* The relevant extracts stating the plates required for the ammunition as above.

28. *(a)* 4 proceeds as follows:—
- (i) Check that the tables in para 27 are correct.
- (ii) Check that all range plates issued for the BCC are on hand.
- (iii) Ensure that the BCC is fitted with the correct plates for the ammunition named.

(b) 4 reports "BCC READY FOR ACTION".

SECTION 10—To Renew Paper on the Plots

29. *(a)* Open the front and rear covers by releasing the catches.

(b) Remove the wooden roller from the roll of paper, and pass the metal roller through the paper, having first removed the knurled screw. The knurled screw is replaced and the metal roller is then held so that the free end of the paper comes off the top of the roller.

(c) Replace the metal roller in its holder.

(d) Lift the center marker and the tension rollers, pass the paper under the glass handrest and then fold the end of the paper in the form of a "V".

(e) Pass this "V" through the longer slot of the wooden roller, rotate it by hand to put on tension. Care must be taken to keep the paper running square.

(f) Lower the tension rollers and center marker, close and lock the covers.

SECTION 11—To Position the Pens in the Plots

30. *(a)* Insert the RF (red) pen into the upper carrier and the gun (blue) pen into the lower carrier.

(b) Lower the pens by pushing back the pen lifting lever.

(c) Adjust the lower pen in its carrier until its point rests on the paper just clear of the straight-edge.

(d) Adjust the upper pen in its carrier until the point rests on the paper just clear of the lower pen.

(e) Pull the pen lifting lever forward to see whether the points of both pens are lifted off the paper. If incorrect, re-adjust.

(f) Position the upper carrier to put the RF pen about $\frac{1}{3}$ the width of the plot paper from the right edge of the paper. Position the lower carriage to put the gun pen about $\frac{1}{3}$ the width of the plot paper from the left edge of the paper.

SECTION 12—To Alter the Charge Pack

(This is to ensure that the automatic travel corrections evolved by the FDT are correct for the particular charge and projectile in use.)·

31. *(a)* Set the range correctional scales to zero.

(b) Place the clutch in the 'tuning and following' position, operate the tuning following and plotting handle on the range plot until the gun range counter is reading zero.

(c) By means of the knurled knob on the charge pack indicator set the correct figure under the window according to the charge and projectile in use. IT IS IMPORTANT THAT THIS IS DONE ONLY AT ZERO RANGE.

Note.—The red indicator on the charge pack will not fall until zero range is reached and no attempt should be made to change the setting until the red indicator has fallen. If it should fail to fall, the armament artificer (instruments) must be informed immediately.

(*d*) Tune the FDT to the required range.

SECTION 13—To Test the FDT Hand Drive

32. (*a*) The PO orders "TEST HAND DRIVE".

(*b*) 4 acknowledges and proceeds as follows:—

(i) Places clutch handles to "hand drive".

(ii) Start the stop watch in its holder, and turn the hand drive handle clockwise just fast enough to ensure that the stopwatch hand can be kept in alignment with the index line on the glass cover.

(iii) Place clutch handle to "motor drive".

(*c*) 4 reports "HAND DRIVE CORRECT" or otherwise.

SECTION 14—To Test and Adjust the Main Speed Drive.

33. (*a*) The PO orders "SWITCH ON FDT POWER".

(*b*) 1 acknowledges, switches on the main power and rectifier switches and reports "FDT POWER SWITCHED ON".

34. (*a*) The PO sets the model ship to an inclination of 045 degrees right or left and the speed to maximum.

(*b*) 4 sets the clutch to *'motor drive'*.

(*c*) The PO switches on the oil pump motor.

(*d*) The PO slowly engages the motor starter.

(*e*) The PO switches on the main drive motor.

35. (*a*) The PO orders "TEST AND ADJUST THE MAIN DRIVE".

(*b*) 4 acknowledges, and proceeds as follows:—

(i) Sets the governor shorting switch to "ON".

(ii) With the governor regulator reading zero, he adjusts the series resistance until the hand of the stopwatch moves slowly counterclockwise to the index line on the watch cover glass.

(iii) Line up the index line on the glass cover with the stopwatch hand.

(iv) Turn the governor shorting switch to "OFF" and adjust the governor regulator until the speeds agree.

(*c*) 4 reports "MAIN DRIVE CORRECT"

(*d*) The PO ensures that the gun bearing dial and the gun range counter are functioning in accordance with the course and speed set.

(*e*) 2 and 3 set the paper clutches to "start", lower the pens and check that the paper is rolled off correctly and that the timing pencils operate correctly.

36. (*a*) 2 and 3 raise the pens from the plots and declutch the paper drives

(*b*) PO switches off:—
  (i) main drive motor
  (ii) oil pump motor.

(*c*) The PO orders "SWITCH OFF"

(*d*) 1 acknowledges, switches off the main power and rectifier switches, and reports "SWITCHED OFF".

SECTION 15.—To Prepare the MCFIA for Action

37. The PO carries out the following procedure while the main power is switched on for the testing of the main drive (sec. 14).

To check the apparatus

38. (*a*) Ensure that the apparatus power switch is at 'OFF'.

(*b*) Open the front section and blow any dust from the relay contacts.

(*c*) Open the rear section and inspect, and if necessary replace, the $\frac{1}{4}$ amp fuses in the fuse panel.

(*d*) Ensure that the lamp cap and bulb removers, spare bulbs and spare fuses are on hand.

(*e*) Close and fasten the sections of the apparatus.

To test the apparatus

39. (*a*) Put the apparatus power switch to "ON".

(*b*) Put all toggle switches on the front of the apparatus to "ON".

(*c*) Press the red failure lamps test push button, and check that the buzzer sounds (and that all red lamps light). If incorrect adjust as detailed in para. 40.

(*d*) Keep the push button pressed, and put the test key on the front of the apparatus to "failure". Check that the buzzer stops sounding and the red lamps brighten. If incorrect, adjust as detailed in para. 40.

(e) Release the push button, put the test key to "continuity" and check that all green lamps light. If incorrect, adjust as detailed in para. 41.

(f) Put the test key to the central position, and the apparatus power switch to off.

To adjust red lamp and buzzer faults

40. (a) If the buzzer and red lamps fail to operate, inspect and if necessary replace the 'I' fuses in the fuse box. If the fuses are correct, note the fault for adjustment by authorized personnel.

(b) If the buzzer fails to sound but the red lamps light, report the fault for adjustment by authorized personnel.

(c) If some of the red lamps fail to light, replace the faulty lamps as detailed in para. 42. If still incorrect, note the fault for adjustment by authorized personnel.

To adjust green lamp faults

41. (a) If all green lamps fail to light, inspect and if necessary replace 'I' fuses in the fuse box. If the fuses are correct, note the fault for adjustment by authorized personnel.

(b) If some of the green lamps fail to light, put the apparatus power switch to 'off', and inspect and if necessary replace $\frac{1}{4}$ amp. fuses in the apparatus. If the fuses are correct, replace, the faulty lamps as detailed in para. 42. If still incorrect, report the fault for adjustment by authorized personnel.

To change bulbs

42. (a) Pull the lamp cap from its socket, using the lamp cap remover if available.

(b) Pull the bulb from its socket with the bulb remover; or, with the power off, open the front section and push the bulb out of its socket with a blunt, soft instrument (eg, a matchstick).

(c) Push in a new bulb and the lamp cap.

SECTION 16.—TO LINE UP THE FDT

43. To line up the FDT is to obtain correct relationship between received and transmitted bearing and range when following a RF.

44. The FDT may be lined up either in "power" or in "hand". The order "LINE UP" will be considered to mean LINE UP IN POWER. If lining up in hand is desired the order LINE UP IN HAND will be given.

To line up in power

Scales zero

45. *(a)* The PO orders "SCALES ZERO".

(b) All clutches are set to power.

(c) PO sets the dumaresq speed to zero.

(d) PO switches on the oil pump and main drive motors.

(e) 2 and 3 set the spotting boxes to zero and report "BEARING/RANGE SPOTTING ZERO".

(f) 1 and 5 check the bearing and range rates balance indicators to ensure that they are central and report "BEARING/RANGE RATE ZERO".

(g) PO checks that the dumaresq and bearing output dial are reading the same bearing, and that the table range counter and the gun range counter are reading the same range.

(h) PO examines the travel correction indicators to ensure that they are reading zero travel.

(j) If there is any discrepancy in the dial readings, PO orders "CORRECT TABLE BEARING/RANGE" (Para. 47 and/or 48).

To line up

The bearing and range used for lining up should be any whole 10 degrees for bearing and any multiple of 1,000 yards for range. In the following example 150 degrees and 8,000 yards have been selected.

46. *(a)* PO orders "LINE UP AT 150 DEGREES, 8,000 YARDS".

(b) PO ensures that the don't apply levers are in the "down" position.

(c) 2 and 3 put their clutches in the "tuning and following" position, turn the tuning following and plotting handles until their transmitter dials read 150 degrees and 8,000 yards.

(d) 2 and 3 put their clutches into the "plotting" position, turn the tuning following and plotting handles until the mechanical pointers of the bearing and range followup dials read 150 degrees and 8,000 yards respectively.

(*e*) 2 and 3 put their clutches to the "tuning and following" position.

(*f*) 2 positions the range finder pen and reports "BEARING LINED UP".

(*g*) 3 positions the range finder pen and reports "RANGE LINED UP".

NOTE.—It is possible for the travel indicators to read zero when the bearing scale of the dumaresq and the gun bearing dial differ by ten degrees (or a multiple of 10 degrees), and/or the table range and the gun range counters differ by 4,000 yards (or a multiple of 4,000 yards).

To correct table bearing

47. (*a*) PO orders "CORRECT TABLE BEARING".

(*b*) PO puts don't apply levers up.

(*c*) If the indices of the bearing travel correction indicators are not co-incident 6 turns the bearing line up handle until they are, at the same time observing that the dumaresq and output dial read the same bearing. If they do not read the same bearing he makes them so by turning the bearing line up handle until the dumaresq, output bearing, and travel indices are reading correctly.

To correct table range

48. (*a*) PO orders "CORRECT TABLE RANGE".

(*b*) PO puts don't apply levers up.

(*c*) If the indices of the range travel correction indicators are not coincident, 6 turns the range line up handle until they are, at the same time observing that the table range counter and the gun range counter are reading the same range. If they do not read the same range he makes them do so by turning the range line up handle until table range counter, gun range counter and travel indices are reading correctly.

(*d*) When using the range line up handle, great care must be taken to ensure that this is done slowly and without any violent movement, as this handle affects the range travel hunter. If during the lining up process it is found that the conditions laid down cannot be met, the RCEME must be imformed at once.

49. When 6 has completed para. 47 and/or 48 he reports "TRAVEL ZERO".

To line up in hand

Scales zero (hand)

50. *(a)* PO orders "SCALES ZERO HAND".
    (b) All clutches are set to hand.
    (c) PO sets the dumaresq speed to zero.
    (d) 2 and 3 set the spotting boxes to zero and report "BEARING/RANGE SPOTTING ZERO".
    (e) 1, using the bearing rate hand drive, ensures that the balance dial is central, places the clutch to power and reports "BEARING RATE ZERO".
    (f) 5, using the range rate hand drive ensures that the balance dial is central, places the clutch to power and reports "RANGE RATE ZERO".
    (g) PO examines the travel correction indicators to see that they are at zero, checks the dumaresq and output dial bearings for agreement, and ensures that the table range and gun range counters show the same range.
    (h) Should there be any discrepancy in the dial readings, PO will order "CORRECT TABLE BEARING/RANGE". (para. 52 and/or 53).

To line up

51. *(a)* 6 puts the bearing and range travel clutches to power.
    (b) Drill as detailed in para. 46 is carried out.

To correct table bearing (hand)

52. *(a)* PO orders "CORRECT TABLE BEARING".
    (b) PO puts the don't apply levers up.
    (c) 6 using the bearing travel hand drive centralizes the bearing travel balance dial which in turn automatically centralizes the outer scale of the bearing travel correction indicators. Using the bearing line up handle he makes the inner pointer of the bearing travel correction indicator coincide with the outer. The bearing scale of the dumaresq and the bearing output dial should now agree. If they do not agree further turning of the bearing line up handle will remedy the error.

To correct table range (hand)

53. *(a)* PO orders "CORRECT TABLE RANGE".
    (b) PO puts don't apply levers up.

(c) 6, using the range travel hand drive makes the outer scale of the range travel correction indicator coincide with the inner scale, which is always at zero when the speed is zero. He centralizes the range travel balance dial by using the range travel line up handle. The table and the gun range counters should now show the same reading. If they differ, the RCEME must be informed at once.

SECTION 17.—To Set the BCC

54. *(a)* 4, on receiving the stand-by bearing and range, selects from the tables the time of flight for that range.

(b) 4 selects from the meteor telegram the group nearest this T/F.

(c) 4 unclamps the following scales, makes the necessary settings, and clamps up after each setting:—

(i) Wind velocity.
(ii) Wind direction.
(iii) Look-out bearing
(iv) The meteor barometer reading against the fixed index.
(v) The air temperature to the index on the barometer scale.
(vi) The three range scale readers to the stand-by range.

(d) 4 reports the ballistic corrections to the PO.

CHAPTER 4

TESTING COMMUNICATIONS AND MAGSLIP TRANSMISSION

SECTION 18.—General

55. Communications are the responsibility of the Royal Canadian corps of Signals. Any faults found during the testing of communications will therefore be reported to the responsible RCCS unit as soon as possible. Attempts to rectify faults will not be made by RCA personnel except in an emergency.

OP tests

56. *(a)* The preparation for action of communications is begun by the testing of telephones, loudspeakers and signal indicators (as applicable) from each of the OPs in the battery in turn. This will include the testing of telephones and loudspeaker from the OP to CR.

(b) For this, such communications switches as are provided (eg, a gang switch in the CR) must be set to the appropriate OP position.

(c) If an OP is equipped with a DRF, testing of dials from the No. 1 range transmitter on the direct route to the guns will be carried out on orders from the OP immediately following the testing of OP communications.

CR tests

57. *(a)* On receipt of the report that the OP communications are correct, the PO orders "TEST CR COMMUNICATIONS".

(b) The POA acknowledges, puts the communications gang-switch (if provided) to the CR position, and proceeds to test telephones, loudspeakers and signal indicators.

(c) On completion of the tests, the POA reports to the PO "CR COMMUNICATIONS CORRECT" (or otherwise).

(d) As soon as the lining up of the FDT and the testing of the CR communications have been completed, the PO proceeds with the testing of the shot indicator and magslip systems.

SECTION 19.—TO TEST TELEPHONES

58. *(a)* The POA puts his telephone on–off switch to 'ON', puts the concentrator key for No. 1 gun to 'ON', rings through to No. 1 gun, and orders "TEST TELEPHONES, No. 1 REPORT".

(b) If the reception at the gun is satisfactory, the No. 1 reports "NO. 1 CORRECT".

(c) The POA puts the concentrator key to 'OFF' and pushes up the corresponding drop-shutter indicator.

(d) No. 1 gun then rings the CR, and the POA checks whether the corresponding indicator buzzes and falls. If the call circuit is correct, he puts the concentrator key to 'ON' and reports "NO. 1 TELEPHONE CORRECT".

(e) The POA then puts No. 1 guns concentrator key to 'OFF' and the indicator up, and goes on to test telephones to each of the remaining guns of the battery in the same way.

SECTION 20.—TO TEST LOUDSPEAKERS

59. *(a)* The POA sets all gun switches to 'ON', the talk listen switch to 'talk', and orders "TEST LOUDSPEAKERS, NO. 1 REPORT".

(b) No. 1 gun calls the CR by telephone, and reports "NO. 1 CORRECT" (or otherwise).

(c) If No. 1 gun reports that the volume is too high or too low, the POA adjusts the gain control accordingly and again orders "NO. 1 REPORT".

(d) When No. 1 gun is correct, the POA goes on to test the loudspeakers of each of the remaining guns of the battery in the same way.

(e) If an adjustment of volume is made for one of the succeeding guns, reports must be obtained again from the preceding guns.

SECTION 21.—TO TEST SIGNAL INDICATORS

60. *(a)* The POA sets the loudspeaker amplifier switches for communication to all guns, and orders "TEST SIGNAL INDICATORS".

(b) He then tests No. 1 gun's signal indicators as follows:—

(i) He orders "NO. 1 TEST".

(ii) When No. 1 gun's green light is illuminated, he reports "CORRECT".

(iii) When No. 1 gun's green light is switched off and its red light is illuminated, he again reports "CORRECT".

(c) When No. 1 gun's red light is switched off, he goes on to test the signal indicators of each of the remaining guns of the battery in the same way.

(d) When all guns have been tested individually, he orders "SWITCH ON".

(e) When all red and green lights come on, and glow steadily and with sufficient intensity, he orders "SWITCH OFF'. "SIGNAL INDICATORS CORRECT".

SECTION 22.—To Test Shot, T/F and Look-In Indicators

General

61. (*a*) The following drill is designed to test that contact switches on the guns operate a shot indicator 'B' unit in the CR, which in turn operate shot indicator 'C' units in the OP and radar room, and also a Mk. 3 or Mk. 4 T/F indicator in the CR. This in turn operates look-in indicators in the OP and the radar room.

(*b*) Local variations from this standard layout will require corresponding modification of the drill (e.g., when using a 'C' Mk. 1 T/F indicator, which is not operated automatically by the shot indicator 'B' unit, the OP will report on the working of only the shot indicators in para. 62).

(*c*) If any fault appears during the tests, the PO will proceed as detailed in paras 68 and 69.

(*d*) The OP should remain through to the CR by telephone throughout the tests; as should the radar room to the OP.

Preparation

62. (*a*) The PO orders "TEST SHOT INDICATORS".

(*b*) The POA passes the order to all guns by loudspeaker.

(*c*) FDT 1 passes the order to the OPA by telephone, who in turn passes it to the radar room.

(*d*) FDT 5 acknowledges the order, and then:—

- (i) Starts the T/F indicator.
- (ii) Turns the T/F indicator dial to set the 10 second time of flight graduation against the index.
- (iii) Reports "READY TO TEST SHOT INDICATORS".

To test automatic operation from each gun

63. (*a*) The PO orders "NO. 1 TEST FIRST CONTACT".

(*b*) The POA passes the order to No. 1 gun. The PO checks whether the shot indicator bell rings and No. 1's lamp illuminates for a satisfactory duration and with sufficient intensity.

(*c*) Ten seconds after giving the first order, the PO orders "NO. 1 TEST SECOND CONTACT".

(*d*) The POA passes the order to No. 1 gun. The PO again checks the operation of the shot indicator. He then orders "OP REPORT".

(*e*) FDT 1 passes the order to the OPA, who in turn passes the order to the radar. Radar 1, having checked whether the shot indicator bell rang and the No. 1's lamp illuminated and that the look-in indicator bell gave a satisfactory double ring, reports to the OPA "RADAR CORRECT" (or otherwise). The OPA, having checked the operation of the OP indicators in the same way, reports for both the radar and the OP "OP CORRECT" (or otherwise).

64. The PO then goes on to test the circuits from each of the remaining guns of the battery in the same way.

To test automatic operation from all guns

65. (*a*) When all guns have been tested individually, the PO orders "STAND BY". "TEST".

(*b*) The POA passes the orders to all guns, and the PO checks whether the shot indicator bell rings and all guns lamps light for a satisfactory duration and with sufficient intensity.

(*c*) The PO then orders "OP REPORT".

(*d*) FDT 1 passes the order, and the OPA reports on the operation of the radar and OP shot indicators with "OP CORRECT" (or otherwise).

66. (*a*) When all is correct, the PO reports "GUN CONTACTS CORRECT".

(*b*) The POA passes the report to all guns.

To test manual operation

67. (*a*) The PO orders "TEST T/F INDICATORS".

(*b*) FDT 5 acknowledges, and trips the T/F indicator manually.

(*c*) Ten seconds after giving the first order, the PO orders "OP REPORT".

(*d*) FDT 1 passes the order, and the OPA reports on the operation of the radar and OP look-in indicators with "OP CORRECT" (or otherwise).

68. (*a*) When all is correct, the PO reports "SHOT INDICATORS CORRECT".

(*b*) FDT 1 passes the report to the OPA, who passes it to Radar.

To adjust shot indicator time delays

69. *(a)* The duration of the indications given by the shot indicators can be varied at the 'B' unit through 1-6 seconds approximately.

(b) If the PO considers (or is informed by the OP) that the duration of the shot indication for any gun is too short or too long, he orders "LENGTHEN (SHORTEN) TIME DELAY FOR NO. . . .".

(c) FDT 1 acknowledges, turns the appropriate time delay adjust screw in the appropriate direction (clockwise to lengthen; counterclockwise to shorten). He then presses all test switches on the 'B' unit and reports "TESTING".

(d) The PO checks the duration of the indications, and if necessary orders further adjustment carried out in the same way. When the duration is correct, he reports "TIME DELAYS CORRECT".

To adjust electrical faults

70. The PO will report the fault to RCEME if:—

(a) One (only) of a gun contact switches fails to operate the shot indicators, and on a re-test of that contact it again fails.

(b) Both of a gun's contact switches fail to operate the shot indicators, but the operation of the corresponding 'B' unit test switch operates the shot indicators.

(c) The test switches on the 'B' unit fail to operate the shot indicators, but the 24V. D-C connections and the strength of the batteries are correct.

(d) The 'B' unit operates correctly, but one of the 'C' units fails to operate, and the 'C' unit test switches do, or do not, operate the 'C' unit.

(e) A shot indicator lamp flashes, but does not stay illuminated or remains illuminated at all times, and the time delay adjust screw is ineffectual.

(f) The shot indicators operate correctly, but the indicating lamps are not bright enough when working together, or the bell fails to operate, and the 24V. D-C supply is correct.

(g) The 'B' unit operates correctly, but the look-in indicators fail to operate, and the T/F indicator is running and set correctly, and the operation of a 'B' unit test switch operates the T/F indicator solenoid audibly and causes its buzzer to sound.

(*h*) The 'B' unit test switch fails to operate the T/F indicator, but the 12V. D-C power supply for the T/F inidcator is correct.

SECTION 23.—TO TEST DIALS WITH MAGSLIP TRANSMISSION

General

71. (*a*) The following drill is designed to test dials between:—
    (i) The primary rangefinder (radar) and the FDT.
    (ii) The secondary rangefinder (DPF) and the FDT.
    (iii) The FDT and the guns.
    (iv) Both rangefinders and the guns.

(*b*) The drill is arranged to provide for changeover between the radar and the DPF, either by a change of route throughout the battery, or by the setting of only 'radar-visual' switches in one of the battery emplacements. (In the latter case, the initial order and report for the emplacement concerned must specify "*RADAR* ROUTE . . .").

(*c*) The test points to be used in a particular battery will be laid down in Standing Orders.

(*d*) The PO should have a form prepared, which outlines the sequence of orders and reports required, and on which he can fill in the various test point readings as they are received.

Communications

72. (*a*) All orders and reports between the PO and the OP and radar will be passed between FDT 1 and OPA by telephone. The OPA will pass the applicable messages to radar and receive its reports.

(*b*) All orders from the PO to the guns will be passed by the POA by loudspeaker.

(*c*) Reports from the guns will be passed by telephone to the POA, who will repeat them to the PO. For this purpose, the POA will keep his concentrator switched through to all guns once the initial reports are made. For the avoidance of confusion, multiple reports from the guns should always be given in numerical sequence of emplacements.

Preparation

73. (*a*) The PO selects a route for testing dials from the radar to the FDT and from the FDT to the guns, and orders "TEST DIALS (RADAR) ROUTE . . .".

(b) The POA repeats to the guns (but omitting "RADAR", if given).

(c) FDT 1 repeats to the OPA, who repeats to the DPF and radar. (If the OP is not equipped with changeover switches, the DPF is not given, and does not report on the route setting).

(d) FDT 1 sets the CR switch according to the switching table (setting 'TFD' when not otherwise ordered) and the changeover switches according to the route cards for the route ordered, and reports "RADAR TO FDT, FDT TO GUNS, ROUTE ... CONTACT".

(e) The POA receives from each of the guns, and repeats to the PO, the report "NO. ... READY TO TEST DIALS, ROUTE ... CONTACT".

(f) FDT 1 receives from the OPA, and repeats to the PO, the radar report "RADAR READY TO TEST DIALS, (RADAR) ROUTE ... CONTACT".

(g) FDT 1 receives from the OPA, and repeats to the PO, the DPF report "DPF SECOND TEST POINT ON, ROUTE ... CONTACT".

Magslip power on

74. (a) The PO orders "SWITCH ON".

(b) FDT 1 acknowledges, switches on the normal magslip power, and reports "SWITCHED ON".

Setting first test point

75. (a) The PO orders "GO TO FIRST TEST POINT".

(b) FDT 1 repeats to the OPA, who repeats to the radar.

(c) FDT 2 and 3 go to the first test point.

(d) FDT 2 and 3 report "FDT BEARING/RANGE FIRST TEST POINT ON".

(e) FDT 1 receives from the OPA, and repeats to the PO, the radar report "RADAR FIRST TEST POINT ON".

Reading first test point

76. (a) The PO orders "TABLE READ".

(b) FDT 2 and 3 read their electrical pointers, and report "BEARING/RANGE ....".

(c) The PO orders "NO. 1 READ".

(d) The POA repeats to the guns, and receives and repeats to the PO No. 1 gun's report "NO. 1 BEARING .... RANGE ....".

(e) The PO orders and receives readings from each of the remaining guns of the battery in the same way.

(f) The PO orders "OP READ".

(g) FDT 1 repeats to the OPA, and receives and repeats to the PO the reading of the OP repeat dials, in the report "OP BEARING .... RANGE ....".

Setting second test point

77. *(a)* The procedure in para. 74 is repeated, but for the second test point.

(b) FDT 2 and 3 turn their handwheels slowly and smoothly, and at the same time observe the movement of their electrical pointers to ensure that they are working smoothly.

Reading second test point

78. *(a)* The PO orders "TABLE REPORT".

(b) FDT 2 and 3 read their electrical pointers, and report "BEARING/RANGE WORKING SMOOTHLY ......".

(c) The PO orders "NO. 1 REPORT".

(d) The POA repeats to the guns, and receives, and repeats to the PO, the report "NO .... DIALS WORKING SMOOTHLY, BEARING, ... RANGE ....".

(e) The PO orders and receives readings from each of the remaining guns of the battery in the same way.

(f) The PO orders "OP REPORT".

(g) FDT 1 repeats to the OPA; and receives, and repeats to the PO, the reading of the OP repeat dials in the report "OP DIALS WORKING SMOOTHLY, BEARING...... RANGE ....".

Magslip power off

79. *(a)* The PO orders "SWITCH OFF".

(b) FDT 1 acknowledges, switches off the magslip power, opens (with CDX radar) the 'TFD' contacts on the CR switch, and reports "SWITCHED OFF".

Setting third test point

80. *(a)* The procedure in para. 74 is repeated, but for the third test point.

Magslip power on

81. *(a)* The procedure in para. 78 is repeated, except that FDT 1 closes the 'TFD' contacts on the CR switch before switching on the magslip power.

Reading third test point

82. *(a)* The procedure in para. 75 is repeated.

Changeover to DPF

83. *(a)* If the changeover between radar and DPF requires a change of route, the PO orders "SWITCH TO ROUTE...".

(b) The POA and FDT 1 repeat, and receive, and repeat to the PO, the appropriate reports of "..... ROUTE...... CONTACT".

(c) If the changeover is made by settings of 'radar-visual' switches only (eg, in the radar room), the PO orders "RADAR SWITCH TO VISUAL".

(d) FDT 1 repeats, and receives, and repeats to the PO, the radar report "RADAR VISUAL CONTACT".

Reading second test point

84. The procedure in para. 75, *(a)* and *(b)*, is repeated.

Magslip power off

85. The procedure in para. 78 is repeated, except that FDT 1 does not alter the CR switch setting.

Changeover to guns direct.

86. *(a)* The PO orders "SWITCH TO GUNS DIRECT".

(b) FDT 1 acknowledges, sets the CR switch to the 'guns direct' position, and reports "GUNS DIRECT CONTACT".

Alternative power on

87. *(a)* The PO orders "SWITCH ON ALTERNATIVE POWER".

(b) FDT 1 acknowledges, switches on the alternative magslip power, and reports "ALTERNATIVE POWER SWITCHED ON".

Reading second test point

88. The procedure in para. 75, *(c)* and *(d)*, is repeated.

Applying corrections

89. *(a)* The PO orders "DPF PUT ON MAXIMUM RIGHT AND ADD CORRECTIONS".

(b) FDT 1 repeats to the OPA; and receives, and repeats to the PO, the DPF report "DPF MAXIMUM RIGHT AND ADD CORRECTIONS ON".

(c) The procedure in para. 75 *(c)* and *(d)*, is repeated.

(d) The PO orders "DPF PUT ON MAXIMUM LEFT AND DROP CORRECTIONS".

(e) FDT 1 repeats to the OPA; and receives, and repeats to the PO, the DPF report "DPF MAXIMUM LEFT AND DROP CORRECTIONS ON".

(f) The procedure in para. 75, *(c)* and *(d)*, is repeated.

(g) The PO orders "DPF SCALES ZERO".

(h) FDT 1 repeats to the OPA; and receives, and repeats to the PO, the DPF report "DPF SCALES ZERO".

Magslip power off

90. The procedure in para. 78 is repeated, except that FDT 1 does not alter the CR switch setting.

Changeover to a direct route

91. *(a)* The PO selects a route for testing dials from the radar to the guns on a direct route, and orders "SWITCH TO (RADAR) ROUTE . . . . . .".

(b) The POA repeats to the guns (omitting "RADAR"); and receives from each gun, and reports to the PO, the report "NO. . . . . ROUTE . . . . CONTACT".

(c) FDT 1 repeats to the OPA, and receives, and repeats to the PO, the radar report "RADAR, ROUTE . . . . CONTACT".

Magslip power on

92. *(a)* The PO orders "NO. . . . . . SWITCH ON".

(b) The POA repeats to the guns, and receives, and repeats to the PO the appropriate guns report "NO. . . . SWITCHED ON".

Reading first test point

93. *(a)* The procedure in para. 75, *(c)*, *(d)* and *(e)*, is repeated.

Changeover to DPF

94. *(a)* If the changeover between radar and DPF is made by settings of 'radar-visual' switches, the procedure in paras. 93 and 94 is omitted.

(b) If the changeover requires a change of route, the PO orders "SWITCH TO ROUTE ....".

(c) The POA and FDT 1 repeat; and receive, and repeat to the PO, the appropriate reports of "...... ROUTE...... CONTACT".

Reading second test point

95. *(a)* If the changeover between radar and DPF is made by settings of 'radar visual' switches, the procedure in paras. 93 and 94 is omitted.

(b) The procedure in para. 75 *(c)*, *(d)* and *(e)*, is repeated.

Magslip power off

96. *(a)* The PO orders "NO. .... SWITCH OFF".

(b) The POA repeats to the guns; and receives, and repeats to the PO, the appropriate gun's report "NO. .... SWITCHED OFF".

Conclusion

97. *(a)* The PO selects the route to be set for action in accordance with Standing Orders, and orders "DIALS CORRECT, SWITCH TO (RADAR) ROUTE ....".

(b) The POA and FDT 1 repeat, and receive, and repeat to the PO, the appropriate reports of ".... (RADAR) .... ROUTE...... CONTACT".

(c) FDT 1 sets the CR switch according to the switching table (setting 'FDT' when not otherwise ordered) and the changeover switches according to the route cards, for the route ordered, and reports "RADAR TO FDT TO GUNS, ROUTE ...... CONTACT".

(d) If, the OPO should order the use of an alternative range-finding source, the PO will select and order the route setting accordingly.

SECTION 24.—To Close Down the Auxiliary Generator (ONAN)

98. *(a)* The PO orders "CLOSE DOWN AUXILIARY GENERATOR".

(b) FDT 5 acknowledges, and proceeds to the engine room to:—

(i) Switch off the generator circuit breaker.

(ii) Press the 'stop' button until the engine cuts out (or, if the generator is to be closed down for a considerable period, closes the fuel-line cut-off).

(c) FDT 5 returns to the CR and reports "AUXILIARY GENERATOR CLOSED DOWN".

SECTION 25.—Reports on Completion of Preparation for Action

FDT reports

99. *(a)* FDT 1, when satisfied that the preparation for action has been completed by each member of the FDT detachment, orders "TABLE ATTENTION".

(b) The detachment sit to attention in their position in action.

(c) FDT 1 orders "REPORTS—TWO".

(d) FDT 2 reports on the equipment for which he is responsible, "CORRECT" (or otherwise).

(e) FDT orders "THREE".

(f) FDT 3 reports "CORRECT" (or otherwise).

(g) The procedure in *(e)* and *(f)* is repeated for the remaining FDT numbers in turn.

(h) FDT 1 orders "TABLE REST".

(j) The detachment relax in their positions in action.

(k) FDT 1 checks the lining up of the FDT, and reports to the PO "TABLE READY FOR ACTION".

Final reports

100. *(a)* The POA receives from each of the guns, and repeats to the PO, the report "NO. . . . . READY TO LOAD".

(b) The PO, having received reports from the FDT and from all guns, reports through FDT 1 to the OP "BATTERY READY FOR ACTION".

SECTION 26.—TO STAND EASY

Stand-by bearing and range

101. *(a)* The OP orders "STAND-BY BEARING .... RANGE ...., STAND EASY".

(b) The PO orders "GUN BEARING ...., STAND EASY".

(c) The POA repeats to the guns.

(d) The PO orders "TABLE GO TO BEARING .... RANGE ....".

(e) FDT 2 and 3 set the bearing and range ordered.

(f) FDT 6 ensures that the transmitting dials are set to the bearing and range ordered, and report "TABLE BEARING .... RANGE.... ON".

Ballistic corrections

102. *(a)* The PO orders "REPORT BALLISTIC CORRECTIONS".

(b) FDT 4 sets the BCC as detailed in Section 17, and reports "BALLISTIC CORRECTIONS, RIGHT (LEFT) .... ADD (DROP)....".

(c) The PO orders "RIGHT (LEFT) ....". "ADD (DROP) ....".

(d) FDT 2 and 3 repeat the applicable corrections, turn their spotting handwheels to set the spotting dial pointers to the amount ordered, return the red pointers, only, to zero, and each report "ON".

Stand easy

103. *(a)* The PO details such work as he considers necessary to be carried out, and orders "STAND EASY".

(b) The POA supervises the tasks ordered by the PO, details (if required) one of the detachment to remain as dutyman, and dismisses the remainder to the designated stand easy position.

CHAPTER 5

DRILL IN ACTION

SECTION 27.—General Duties

Duties of the plotting officer

104. These duties include:—

(a) Supervising the whole work of the CR.

(b) Ordering such changes in the magslip routing as may be necessary.

(c) Ensuring that the applicable OP orders are carried out correctly by the FDT detachment.

(d) The ordering of "START" when:—

- (i) The table has been tuned, and
- (ii) The initial course and speed have been applied.

(e) Setting the dumaresq in accordance with OP reports, and as required from the 'suggestion crosswires' to obtain fresh course and speed.

(f) Reporting "BATTERY READY" to the OP when the guns and the FDT are ready, but the order to 'fire' has not been received from the OP.

(g) The ordering of "DON'T APPLY—PLOTS STALE" and the operation of the 'don't apply levers' before altering the dumaresq, after fire has been opened.

(h) Controlling the fire of the battery, with the assistance of the POA, when the order to fire has been received from the OP.

(j) Ensuring that, if at hand drive, 6 has remade coincidence on the travel hunter index before putting the 'don't apply levers' down.

(k) Carrying out the drill for 'turns' procedure.

(l) Ordering the appropriate drill carried out before 'standing easy'.

Duties of the plotting officer's assistant

105. These duties include:—

(a) Onward transmission to the guns of all orders appertaining to them.

(*b*) Where the signal indicators are not situated so as to be visible to the PO, reporting:—

(i) "THROUGH", when the guns acknowledge with their green lights.

(ii) "GUNS READY", when all red lights are switched on from the guns.

(*c*) Reporting "GUNS READY", when applicable, when 'turns' procedure is in progress.

(*d*) Ascertaining the cause, and reporting it to the PO, of any delay in the execution of fire orders by the guns.

(*e*) Supervising the FDT detachment on the order to 'cease firing'.

Duties of 1

106. These duties include:—

(*a*) Switching on the magslip and FDT power and the MCFIA.

(*b*) Passing orders and reports between the PO and the OP.

(*c*) Switching off magslip and FDT power and the MCFIA when ordered.

(*d*) The operating of the 'bearing hand drive' when 'hand drive' is ordered.

(*e*) Reporting to the PO that the bearing oil motor has failed when the balance pointer swings away from the centre.

Duties of 2

107. These duties include:—

(*a*) The tuning of the bearing plot to the rangefinder in use on the order "TAKE POST", and the reporting of "BEARING TUNED" on completion of tuning.

(*b*) The application of the ballistic correction as ordered by the PO.

(*c*) On the order "START" from the PO, the lowering of the pens gently on to the paper, and the setting of the 'paper clutch' to the 'start' position.

(*d*) Maintaining exact coincidence between the mechanical and electrical pointers when 'following' the rangefinder.

(*e*) Gridding up whenever 1½ inches of reliable track has developed.

(*f*) The repetition and application of all bearing spotting corrections ordered by 1 and the reporting of "ON" when these corrections have been applied.

(*g*) Drawing a line across the plot when "DON'T APPLY" and/or "PLOTS STALE" is ordered, and marking DA and/or PS above the line to indicate stale information.

(*h*) Bringing the mechanical pointer coincident with the electrical pointer when changing from one system of range-finding to an other. This must be carried out with the clutch at the 'plotting' position.

(*j*) Recording on the plot all corrections applied and 'shot'.

(*k*) Carrying out the drill for scales zero.

(*l*) Stopping the plot on the orders "REST and" "STOP TABLE".

Duties of 3

108. These duties are as for 2, except that he is responsible for the range plot.

Duties of 4

109. These duties include:—

(*a*) The adjustment of the speed of the motor by means of the governor regulator.

(*b*) Operating the 'main speed drive' by hand when "HAND DRIVE" is ordered by the PO.

(*c*) Reading fresh ballistic corrections from the BCC when ordered to do so by the PO, either in action or during a pause in action.

(*d*) Carrying out the drills as ordered prior to standing easy.

Duties of 5

110. These duties include:—

(*a*) Operating the T/F indicators, by

- (i) Applying the range read from the 'gun range counter'.
- (ii) Pushing the 'hand operating plunger' if relays from the guns are not fitted.

(*b*) Starting the T/F indicator when "START" is ordered by the PO.

(*c*) With the Indicator T/F Mk. 4, ensuring that it is rewound when necessary.

(*d*) Assisting the PO during turns procedure.

(*e*) Operating the 'range hand drive' when "HAND DRIVE" is ordered by the PO.

(*f*) Reporting the failure of the range oil motor to the PO when the balance dial pointer swings away from centre.

(*g*) Carrying out drills ordered prior to standing easy.

Duties of 6

111. These duties include:—

(*a*) Starting up the auxiliary generator.

(*b*) Operating the travel correction hand drive when "HAND DRIVE" is ordered by the PO.

(*c*) Reporting the failure of the travel correction oil motors to the PO when the balance dial pointer swings away from the centre.

(*d*) Closing down the auxiliary generator when ordered.

SECTION 28.—INITIAL ORDERS

General

112. (*a*) When no action is imminent, the CR detachment may be employed at maintenance duties or training in the battery area.

(*b*) When an immediate state of readiness is in effect, the CR detachment will remain at the designated 'stand easy' position, and the duty man will be at his post in the CR.

Take post

113. (*a*) The CR duty man (or FDT 1) receives from the OP, and repeats to the PO and the remainder of the CR detachment, the order "TAKE POST".

(*b*) The PO orders "TAKE POST".

(*c*) The POA (having switched on the amplifier) repeats to the guns, and (if the signal indicators are not situated so as to be visible to the PO), when all guns have acknowledged, reports "THROUGH".

(*d*) FDT 1 switches on the magslip and FDT power and the MCFIA, and then takes up his position in action.

(*e*) FDT 6 starts up the auxiliary generator as detailed in para. 25, and then takes up his position in action.

Method of rangefinding

114. *(a)* If no alternative order is received, the normal method of rangefinding (ie, radar) will be understood to be in use.

(b) If another rangefinder is to be used, this will be indicated in the initial orders; eg, "FOLLOW PF BEARINGS, FOLLOW PF RANGES".

(c) On receipt of an alternative order, the PO will order such adjustment of the magslip routing as may be necessary; eg, "RADAR, SWITCH TO VISUAL".

Ammunition

115. *(a)* If no alternative order is received, the ammunition for which the equipment is set up will be understood to be in use.

(b) If another nature of ammunition is to be used, this will be indicated in the initial orders.

(c) On receipt of an alternative order, the PO will order the changing of cams, etc., on the guns; and of the FDT 'charge pack', the T/F indicator range dial, the BCC range scales and the 'set-ahead table' range strip, in the CR.

Description of target

116. *(a)* FDT 1 receives from the OP, and repeats to the PO, the order "TARGET SHIP".

(b) The PO orders "TARGET SHIP".

(c) The POA repeats to the guns (and reports their acknowledgement).

(d) FDT 2 and 3, with their clutches at 'T&F', match pointers on the bearing and range follow-up dials, and report "BEARING/RANGE TUNED".

Course and speed

117. *(a)* FDT 1 receives from the OP, and repeats to the PO, the order "COURSE ..... SPEED .....".

(b) The PO sets the dumaresq to the course and speed ordered, and reports "COURSE SET, SPEED. . . .".

(c) The PO orders "START". (as detailed in section 29)

Initial corrections

118. If an initial correction is ordered from the OP (eg, for spread for line), the PO ensures that the correct procedure is carried out (section 35).

Method of opening fire

119. *(a)* If no alternative order is received, the normal method of opening fire (i.e., ranging salvos) will be understood to be in use.

(b) If another method of opening fire is ordered by the OP, the PO will order it for repetition to the guns.

Opening fire

120. *(a)* The PO observes the plots, and if necessary supervises FDT 2 and 3 in gridding up, to ensure that the correct FDT rates are set as rapidly and accurately as possible.

(b) The PO observes the signal indicators to see when all red lights are switched on from the guns; or, if they are not situated so as to be visible to the PO, the POA observes them and, when all red lights are on, reports to the PO "GUNS READY".

(c) If the initial order to fire has not been received from the OP by the time the FDT rates are reasonably correct, and all guns are ready, the PO will report through FDT 1 to the OP "BATTERY READY".

(d) If the initial order to fire has already been received, the PO will not report, but will fire the first salvo (section 36).

SECTION 29.—To Start the FDT

121. *(a)* As soon as the initial FDT rates are set (para. 116), the PO orders "START".

(b) The PO starts the table.

(c) 4 starts the stop watch.

(d) 2 and 3 set the paper clutches to "START" and lower the pens on to the paper.

(e) 5 sets the speed reported by the PO on the 'table of set ahead angles', and the cursor under the range showing on the gun range counter.

(f) 5 starts the T/F indicator.

SECTION 30.—To Operate the FDT Drives

Main drive

122. *(a)* While the FDT is running in main drive, FDT 4 frequently observes the stop-watch in its holder.

(*b*) If the main drive is seen to be consistently too fast or too slow, he will adjust the governor regulator in the appropriate direction, and continue to observe.

(*c*) If the governor regulator is not able to correct the speed, he will report to the PO "MAIN DRIVE FAST (SLOW) . . . . PER MINUTE".

Hand drive

123. (*a*) If the main drive speed error continues to exceed the tolerance of one second per minute, or in the event of a complete failure of the main drive, the PO orders "CHANGE TO HAND DRIVE".

(*b*) FDT 4 will acknowledge, and then:—

(i) Place clutch to 'hand'

(ii) Turn the hand-drive handle clockwise at the speed required to keep the stop-watch hand stationary in relation to the index-line on the glass cover.

SECTION 31.—TO OPERATE THE MK. 4 T/F INDICATOR

Normal operation

124. (*a*) FDT 5 keeps the T/F indicator range dial accurately set to the range indicated by the FDT range transmitting dials.

(*b*) FDT 5 should note particularly that the application of range spotting corrections alters the transmitted range suddenly, and that this action generally is followed closely by the firing of the guns. Therefore, rapid corresponding adjustment of the T/F indicator range setting is essential.

(*c*) FDT 5 keeps the indicator wound so that the rewind indicator never reads less than 'half'.

Manual operation

125. (*a*) If the T/F indicator is not operated automatically, FDT 5 will strike the plunger each time that an indication of 'shot' is given by:—

(i) The sounding of the shot indicator bell, when this system is in operation.

(ii) The reporting of "SHOT" by the POA, when the shot indicator system is not in operation.

(*b*) If the look-in indicator system is not in operation, each time the T/F indicator sounds the look-in warning he will report through FDT 1 to the OP, "LOOK-IN".

Altering the look-in interval

126. *(a)* If the OP requires a longer look-in interval, FDT 1 will receive, and repeat to FDT 5, the order "INCREASE LOOK-IN BY . . . . . SECONDS".

(b) FDT 5 will set the T/F indicator range dial continuously less than the transmitted ranges by the amount equivalent on the dial to the time interval ordered.

SECTION 32.—TO GRID UP

Bearings and ranges

127. *(a)* FDT 2 and 3 continuously adjust for any differences between the FDT rates and the RF rates by turning their follow-up handwheels to keep the mechanical pointers of the follow-up dials in accordance with the electrical pointers. This causes the RF pens to draw sloped lines on the plots, the obliquity of which is proportional to the amount of rate error.

(b) They make allowance for unsteady rangefinding, as far as possible, by smoothing the RF rates in accordance with the apparent mean tendency of the movement of the electrical pointers.

(c) If, in the process of smoothing, they find that they are leading or lagging the electrical pointers by a consistent amount, they match them by sudden movements of the hand wheels, so that the resultant lines drawn on the plots can be distinguished from indications of rate errors.

Reliability of plot indications

128. *(a)* The smoothness of the RF pen tracks on the plots will vary according to the steadiness of the rangefinder, and the skill of FDT 2 and 3 in smoothing the rate differences.

(b) FDT 2 and 3 must avoid making premature decisions on plot indications, and normally should allow 1½ inches of plot to develop before taking action.

(c) The PO will observe the plots as frequently as possible to ensure that the operators discern between spurious track deviations and erratic but authentic rate error indications, the mean tendency of which can be interpreted.

(d) If continuously erratic tracks indicate that adverse rangefinding conditions are making smooth following for bearing and/or range impossible, the PO will notify the OPO.

Measurement of plot indications

129. *(a)* Whenever a reliable track develops on a plot, the operator concerned rotates the grid to bring it parallel; this is done by 2 and 3 by means of the 'error in speed' handwheel.

(b) PO checks the 'suggestion crosswires' on the dumaresq to assess the true course and speed of the target. Alterations to FDT rates is as detailed in section 33.

(c) If at any time an RF pen line is impossible to measure reliably, the operator concerned reports to the PO "BEARING/RANGE PLOT UNRELIABLE".

(d) The plots will not be gridded while 'turns procedure' (section 37) is in progress.

Extreme indications

130. *(a)* If at any time it is not possible to rotate a grid far enough to bring it fully parallel to the track (possibly when the initial course and speed settings on the dumaresq are stale), the PO acts upon a reasonable estimation of the probable reading.

(b) If at any time the RF pen is carried so far across the plot so as to interfere with the gun pen track, or the carrier runs off the lead screw, the operator concerned will declutch and reposition it.

SECTION 33.—To Correct the FDT Rates

General

131. *(a)* The plot operators make direct and independent adjustments which effect the 'suggestion crosswires' and allow the PO to make rate adjustments.

(b) Subsequent courses and speeds as may be reported from radar or DPF plots will be compared with those already set on the dumaresq and confirmed by the plots; but normally they will not be applied in preference. If at any time they are in marked disagreement, the PO will report the discrepancy to the OP, so that its cause may be determined.

Direct rate adjustment

132. *(a)* FDT 2 and 3 having gridded up they report "BEARING/RANGE GRIDDED".

(*b*) The PO turns his 'inclination setting' handwheel and his 'target speed setting' handwheel to bring the speed indicating marker immediately under the intersection of the suggestion lines.

(*c*) FDT 2 and 3 mark their plot as stale (section 34), and then allow a fresh reliable track to develop before re-gridding.

(*d*) Whenever the PO sets the dumaresq to a different speed he reports "SPEED . . . .".

SECTION 34.—TO MARK THE PLOTS

General

133. (*a*) FDT 2 and 3 will always carry out the procedure in para. 133, and, whenever possible during action, practice, or drill series will also record the details in para. 134–135.

Plots stale

134. Whenever a rate adjustment is made (indicated by the realinement of the grid), the operator concerned draws a line against the straightedge across the RF pen track, and letters it "PS", as the means of distinguishing between stale and fresh rate error indications.

Shot

135. When 'shot' for each salvo is received, each operator marks an "X" on his gun pen line, numbering them "1", "2", etc., in sequence as they occur.

Spotting corrections

136. Whenever a bearing or range correction is ordered, the operator concerned records it against the horizontal line drawn on his plot by the movement of the gun pen when the correction is applied.

SECTION 35.—TO APPLY CORRECTIONS

Spotting (and initial) corrections

137. (*a*) When the initial ballistic corrections are applied to the spotting dials (para. 101), the black pointers are left at the amounts ordered, and the red pointers at zero.

(*b*) Subsequently, FDT 1 receives from the OP, and repeats to FDT 2 and/or 3, the orders "RIGHT (LEFT) . . . . . ". "ADD (DROP) . . . . . ".

(c) The operator concerned repeats the applicable correction, turns his spotting correction handwheel to move the red pointer of the spotting dial in the appropriate direction to the amount ordered, and reports "ON".

(d) He then returns the red pointer only to zero by hand. (Care must be taken to return it to zero exactly, or else an accumulation of minor errors will result.)

(e) The PO observes to ensure that all corrections are applied promptly and correctly.

(f) FDT 2 and 3 mark their plots as detailed in para. 135.

(g) If the application of a correction carries a gun pen so far across the plot as to interfere with the RF pen track, or to run its carrier off its lead-screw, the plot operator concerned will declutch the carrier and re-position it.

SECTION 36.—Orders During the Engagement of a Ship Target

138. *(a)* At ranging salvoes as soon as the FDT and the guns are ready and the order to fire has been received (para. 119), the PO orders "STAND BY".

(b) The POA repeats to the guns, and (if the signal indicators are not situated so as to be visible to the PO), when all guns have acknowledged, reports "THROUGH".

(c) Five seconds after giving the first order, the PO orders "FIRE".

(d) The POA repeats to the guns (and reports their acknowledgement).

(e) If the shot indicator system is not in operation, the POA will report "SHOT" when the red lights are switched off from the guns; and FDT 5 will operate the T/F indicator as detailed in para. 124.

(f) FDT 2 and 3 mark their plots as detailed in para. 134.

(g) The PO observes the plots, and if necessary supervises FDT 2 and 3 in gridding up, to ensure that the correct FDT rates are maintained.

(h) If the signal indicators are not situated so as to be visible to the PO, the POA observes them, and, when all red lights are switched on again, reports "GUNS READY".

(j) If the next order to fire is preceded by the ordering of corrections, the PO will ensure that these are correctly applied before firing.

(k) If the order to fire has not been received from the OP by the time both the FDT and the guns are ready, the PO will report through FDT 1 to the OP "BATTERY READY".

(l) If the order to fire has already been received, the PO will not report, but will fire the salvo as in *(a)* to *(f)* above.

(m) The procedure in *(g)* to *(l)* above is repeated until further orders are received.

Salvo fire

139. *(a)* FDT 1 receives from the OP, and repeats to the PO, the order "SALVO FIRE".

(b) If this order is preceded by the ordering of corrections, the PO will ensure that these are correctly applied before firing.

(c) As soon as the FDT and the guns are ready as in para. 137 *(g)*—*(h)*, a salvo will be fired as in para. 137 *(a)*—*(f)*.

(d) The procedure in *(c)* is continued, without further orders to fire from the OP.

Missing a salvo

140. *(a)* If a gun fails to fire in a salvo within five seconds of the remainder, the PO (or the POA, if the PO does not observe it) will order "NO. . . . . STOP".

(b) The POA will ascertain the cause of the delay, and report the reason to the PO.

(c) If the failure to fire is due to a misfire, the No. 1 of the gun concerned will report it, switch off his red light, carry out his misfire drill, and then switch on his red light when ready to fire again. If the signal indicators are not situated so as to be visible to the PO, the POA will then report "NO. . . . . READY".

(d) When the red light is switched on from the gun concerned, the PO will proceed the firing of the next salvo with the order "NO. . . . . GO ON".

Battery fire

141. *(a)* FDT 1 receives from the OP, and repeats to the PO, the order ". . . . ROUNDS BATTERY FIRE".

(b) The PO orders "BATTERY FIRE".

(c) The POA repeats to the guns (and reports their acknowledgement).

(d) The PO orders "NO. 1 FIRE".

(e) The POA repeats to the guns.

(f) The PO proceeds to fire the remaining guns of the battery in the same manner, with a five-second interval (unless otherwise ordered) between each round. He carries on through the battery again, as necessary, until each gun has fired the specified number of rounds. He will then await further orders from the OP, meanwhile, reporting when the battery is ready.

(g) If the guns are required to fire in succession from the left, this will be indicated in the order from the OP.

Missing a round of battery fire

142. *(a)* If a gun fails to fire when ordered, the PO will order "NO. . . . STOP, NO. . . . . FIRE".

(b) The POA will ascertain the cause of the failure, and report the reason to the PO.

(c) When the gun concerned is again ready to fire, the PO will precede its order to fire in the normal sequence with the order "NO. . . . . GO ON".

Individual gun corrections

143. *(a)* FDT 1 receives from the OP, and repeats to the PO, the orders "NO. . . . . RIGHT (LEFT) . . .". "NO. . . . ADD (DROP) . . . .".

(b) The PO passes these to the POA for repetition to the guns.

SECTION 37.—ENGAGEMENT OF A TURNING TARGET

Preparation

144. *(a)* While the target is on a steady course, the PO keeps the dumaresq set in accordance with the suggestion lines. He has the 'rate of turn table' and a stop-watch at hand.

(b) FDT 5 keeps the slide on the "FOLLOWING" side of the 'set ahead table' set to the speed reported by the PO, and the cursor set under the range read from the FDT transmitting dials.

Start of the turn

145. *(a)* FDT 1 receives from the OP, and repeats to the FDT detachment, the order "TARGET TURNING TO STARBOARD (PORT)".

(*b*) FDT 5 reads the figures under the cursor of the 'set ahead table', and reports "SET AHEAD .... DEGREES, SPEED ....".

(*c*) The PO:—

- (i) Starts his stop-watch.
- (ii) Sets the suggestion pointer divergent from the model ship in the appropriate direction (clockwise for "starboard"; counterclockwise for "port"), by the amount of the angle reported.
- (iii) Turns the dumaresq to set the model ship to the course indicated by the suggestion pointer (allowing the suggestion pointer to remain divergent).
- (iv) Sets the speed figure reported.
- (v) Proceeds to turn the dumaresq smoothly in the appropriate direction at the rate read from the 'rate of turn table', keeping time by means of the stop-watch.

(*d*) FDT 2 and 3 stop gridding the plots.

(*e*) The POA will assist the PO by observing the signal indicators, and, when all red lights are switched on from the guns, reporting "GUNS READY".

End of the turn

146. (*a*) FDT 1 receives from the OP, and repeats to the FDT detachment, the order "TARGET STEADY".

(*b*) FDT 5 reads the 'mean speed after turn' figure under the slide of the 'set ahead table', and reports "SPEED ....".

(*c*) The PO:—

- (i) Turns the dumaresq to set the suggestion pointer (which continues to register the 'set ahead' angle) to the course indicated by the model ship.
- (ii) Sets the speed figure reported.
- (iii) Increases speed at the rate of ½-knot every 30 seconds until the original speed is reached, or until reliable plots are gridded.

(*d*) As soon as reliable tracks develop, FDT 2 and 3 grid up as detailed in section 32.

SECTION 38.—To Change the System of Rangefinding

147. (*a*) FDT 1 receives from the OP, and repeats to the PO, the order (eg) "FOLLOW PF BEARINGS, FOLLOW PF RANGES".

(b) The PO orders such adjustment of the magslip routing as may be necessary, eg, "RADAR, SWITCH TO VISUAL".

(c) FDT 2 and 3 note the effect of the changeover on the electrical pointers of the follow-up dials.

(d) If there is a sudden change, they will put their clutches to "P", bring their mechanical pointers coincident with the electrical pointers, return the clutches to "T&F", and continue to match pointers.

SECTION 39.—TO CHANGE TO A FRESH TARGET

148. *(a)* FDT 1 receives from the OP, and repeats to the FDT detachment, the orders "STOP" "SCALES ZERO".

(b) The procedures in paras 150 and 154 are carried out.

(c) FDT 1 receives and repeats the initial orders for the fresh target, on which the appropriate portions of the drills in section 28, et seq, are carried out.

SECTION 40.—INTERRUPTION OF FIRE

Stop loading

149. *(a)* FDT 1 receives from the OP, and repeats to the PO, the order "STOP LOADING".

(b) The PO passes the order to the POA for repetition to the guns, but carries on to fire a salvo if the guns are already loaded.

(c) The FDT detachment carry on with the drill in progress until a further order (eg, "SCALES ZERO") is received.

(d) If the OP orders "GO ON", the PO will pass this to the POA for repetition to the guns. He will then resume the firing of the guns.

Stop

150. *(a)* FDT 1 receives from the OP, and repeats to the PO, the order "STOP".

(b) The PO passes the order to the POA for repetition to the guns, and stops passing fire orders.

(c) The procedure as in para. 149 *(c)* and *(d)* is carried out. (In the case where "STAND BY" had been ordered before receipt of "STOP", it must be repeated on "GO ON").

Stand fast

151. *(a)* FDT 1 receives from the OP., and repeats to the FDT detachment, the order "STAND FAST".

(b) The PO passes the order to the POA for repetition to the guns.

(c) Stand fast is cancelled by "GO ON".

SECTION 41.—To Rest

152. *(a)* FDT 1 receives from the OP, and reports to the FDT detachment the order "REST".

(b) The PO passes the order to the POA for repetition to the guns.

(c) If FDT 2 and 3 are following a rangefinder they will continue to match electrical and mechanical pointers.

(d) FDT 2 and 3 declutch their plot paper drives, and raise, declutch and re-position their pens.

(e) FDT 5 stops the T/F indicator.

(f) The detachment relax at their positions in action.

(g) "REST" is cancelled by either "TAKE POST" or a fresh sequence of initial orders.

SECTION 42.—Termination of a Shoot

153. *(a)* The OP orders in sequence "STOP LOADING"—"SCALES ZERO"—"CHECK DIALS"—"STAND EASY".

SECTION 43.—Scales Zero

154. *(a)* FDT 1 receives from the OP, and repeats to the FDT detachment, the order "SCALES ZERO".

(b) The PO sets the dumaresq speed to zero.

(c) If FDT 2 and 3 are following a rangefinder, they will continue to match pointers.

(d) Drill as detailed in Section 16 para. 45.

Note.—If the guns have not applied any general corrections, they will not be given the order "SCALES ZERO". Individual gun corrections will be taken off on receipt of the specific order "NO. .... SCALES ZERO".

SECTION 44.—To Check Dials

Preparation

155. *(a)* FDT 1 receives from the OP, and repeats to the PO, the order "CHECK DIALS".

(b) The PO orders "STOP TABLE" and turns the table switch to the "OFF" position.

(c) FDT 5 acknowledges, stops the stop-watch and the T/F indicator.

(d) FDT 2 and 3 stop matching pointers.

(e) FDT 2 and 3 declutch their plot paper drives, and raise, declutch and re-position their pens.

Setting dials

156. *(a)* The PO orders "TABLE CHECK DIALS".

(b) FDT 2 goes to the nearest whole, 10 degrees of bearing.

(c) FDT 3 goes to the nearest whole, 1,000 yards of range.

Reading dials

157. *(a)* FDT 1 receives from the OP, and repeats to the PO, the radar report (RADAR, BEARING ...... RANGE ...... ON).

(b) The PO orders **"read table"**.

(c) FDT 2 and 3 read their electrical pointers, and report "BEARING/RANGE ......".

(d) The PO orders "No. 1 **read**".

(e) The POA repeats to the guns; and receives, and repeats to the PO, No. 1 guns report "NO. 1 BEARING ...... RANGE ......".

(f) The PO orders and receives readings from each of the remaining guns of the battery in the same way.

(g) The PO orders "OP READ".

(h) FDT 1 repeats to the OP, and receives, and repeats to the PO, the reading of the OP repeat dials in the report "OP BEARING ...... RANGE ......".

Conclusion

158. *(a)* When all dials read correctly, the PO orders "DIALS CORRECT".
  (b) The POA repeats to the guns.
  (c) FDT 1 repeats to the OP.

SECTION 45.—TO STAND EASY

159. *(a)* FDT 1 receives from the OP, and repeats to the PO, the order "STAND-BY BEARING ...... RANGE ......; STAND EASY".
  (b) The PO proceeds to order:—
    (i) The guns to stand easy.
    (ii) The FDT lined up.
    (iii) The FDT tuned.
    (iv) The latest ballistic corrections applied.
    (v) The power and the MCFIA switched off.
    (vi) The auxiliary generator closed down.
    (vii) The CR to stand easy.

SECTION 46.—TO CEASE FIRING

160. *(a)* FDT 1 receives from the OP, and repeats to the FDT detachment, the order "CEASE FIRING".
  (b) The PO passes the order to the POA for repetition to the guns.
  (c) The POA supervises the return of stores to the proper places, the general cleaning of equipment and emplacements, the switching off of lights, fans, etc., and the locking of emplacements.
  (d) When he is satisfied that all is correct, he gives the applicable instructions to the detachment and dismisses them to their duties.

SECTION 47.—DUTIES OF THE DUTY MAN

161. The duty man is detailed from the CR detachment. He will remain inside the CR during his tour of duty, and will be responsible for:—
  (a) The passing of messages from the CR to the OP.
  (b) The receipt of messages from the OP, and for ensuring that these messages reach the person concerned.
  (c) Resetting the BCC whenever a new meteor telegram is received, and applying the resultant ballistic corrections to the table.